luminescence-defectoscopy of metals is to be mentioned. Of particular importance are the studies by the Soviet physicists on the luminescence-illumination, which has a great importance in political economicy. Further the Soviet physicists developed different new sorts of phosphorescent substances for various technical purposes: Phosphorescent substances with an especially long duration of luminescence, such for the observation of infrared radiation and for the dosimetry of detrimental radioactive radiation, such with constant intensity and phosphorescent substances for X-ray screens and cathode-ray tubes. There are 1o figures and 248 references, 236 of which are Slavic.

AVAILABLE: Library of Congress

Card 3/3

LEVSHIN, V.L.

24(8) PHASE I BOOK EXPLOITATION SOV/2809

Akademiya nauk SSSR. Otdeleniye khimicheskikh nauk

Termodinamika i stroyeniye rastvorov; trudy soveshchaniya... (Thermodynamics and Structure of Solutions; Transactions of the Conference Held January 27-30, 1958) Moscow, Izd-vo AN SSSR, 1959. 295 p. 3,000 copies printed.

Ed.: M. I. Shakhparonov, Doctor of Chemical Sciences; Ed. of Publishing House: N. G. Yegorov; Tech. Ed.: T. V. Polyakova.

PURPOSE: This book is intended for physicists, chemists, and chemical engineers.

COVERAGE: This collection of papers was originally presented at the Conference on Thermodynamics and Structure of Solutions sponsored by the Section of Chemical Sciences of the Academy of Sciences, USSR, and the Department of Chemistry of Moscow State University, and held in Moscow on January 27-30, 1958. Officers of the conference are listed in the Foreword. A list of other reports also read at the conference, but not included in this work are: are given. Among the problems treated in this work are: electrolytic solutions, ultrasonic measurement, dielectric and thermodynamic properties of various mixtures, spectroscopic analysis, etc. References accompany individual articles.

Levshin, V. L., Ye. G. Baranova, L. D. Derkacheva, and [illegible] Study of Association in Concentrated Solutions of Dyes by Means of Absorption and Luminescence Spectra 275

Levshin, L. V. Effect of Ionization and Association on Optical Properties of Complex Organic Molecules 285

LEUSHIN, V.L.

5(2) PHASE I BOOK EXPLOITATION SOV/2402

Akademiya nauk SSSR. Institut geokhimii i analiticheskoy khimii

Redkozemel'nyye elementy; polucheniye, analiz, primeneniye (Rare Earth Elements; Production, Analysis, and Use) Moscow, Izd-vo AN SSSR, 1959. 331 p. 5,000 copies printed.

Resp. Ed.: D. I. Ryabchikov, Professor; Eds. of Publishing House: D. N. Trifonov and T.G. Levi; Tech. Ed.: S. G. Markovich; Editorial Board: I. P. Alimarin, Corresponding Member, USSR Academy of Sciences, I. V. Tananayev, Doctor of Chemical Sciences, R. V. Kotlyarov, Candidate of Chemical Sciences, V. I. Kuznetsov, Doctor of Chemical Sciences, M. M. Senyavin, Candidate of Chemical Sciences, and Yu. S. Sklyarenko, Candidate of Chemical Sciences.

PURPOSE: This book is intended for chemists in general and for geochemists and analytical chemists in particular.

COVERAGE: This collection of articles consists of reports presented at the Rare Earth Elements Symposium held in June 1956 at the Institute of Geochemistry and Analytical Chemistry imeni V. I. Vernadskiy. The book may be divided into three sections: the characteristics, uses and production of rare earth elements (REE); the methods of analyzing REE; and the application of individual rare earth elements and REE mixtures in the glass and metallurgical industries, and their use as catalysts. Considerable space is devoted to the application of ion-exchange chromatography in the production of pure forms of all rare earth elements. The combinations of this method with other methods in separating REE on an industrial scale are discussed by D. I. Ryabchikov, Yu. S. Sklyarenko, and M. M. Senyavina. Chemical methods of separating REE compounds are discussed by I. V. Tananayev (who is said to be the first in the USSR to develop methods of processing REE), V. P. Kotlyarov, E. P. Andreyeva, A. V. Nikolayev, and G. P. Aleksandrov. Quantitative X-ray spectral analytical methods are described by E. Ye. Vaynshteyn, and chemical methods of analysis by I. P. Alimarin and P. I. Pavlotskaya. The determination of REE impurities in pure products and atomic materials are discussed at length in three articles by A. N. Zaydel' and his associates. All articles are accompanied by photographs, diagrams, tables, and bibliographic references.

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AVAILABLE: Library of Congress

SOV/51-6-1-10/30

AUTHORS: Levshin, V.L. and Baranova, Ye.G.

TITLE: Investigation of the Nature of Concentration Quenching of Luminescence of Dyes in Various Solvents and Classification of the Various Types of Quenching (Issledovaniye prirody kontsentratsionnogo tusheniya lyuminestsentsii krasiteley v raznykh rastvoritelyakh i razdeleniye razlichnykh vidov tusheniya)

PERIODICAL: Optika i Spektroskopiya, 1959, Vol 6, Nr 1, pp 55-64 (USSR)

ABSTRACT: This paper was presented at the VIth Conference on Luminescence, February 19, 1958. The paper discusses various methods of transfer of excitation energy between molecules in concentrated solutions of rhodamine 6Zh and rhodamine 3B which produce quenching and depolarization of luminescence. In any solution at high concentrations there may occur three types of quenching which can be superimposed on one another. These three types of quenching are: (1) quenching by transfer of excitation energy from one monomer to another monomer (type I quenching); (2) quenching by transfer of excitation energy to dimers and higher associates (type II); (3) quenching due to non-active absorption by non-luminescing associates (type III). Type I quenching depends on the absolute concentration of monomers. Type II quenching depends on the

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Investigation of the Nature of Concentration Quenching of Luminescence of Dyes in Various Solvents and Separation and Classification of the Various Types of Quenching

absolute concentration of dimers. Type III quenching depends on the ratio of the products of concentrations and absorption coefficients of monomers and dimers. The three types of concentration quenching in solutions were separated by (a) study of the absorption spectra, (b) study of the change of intensity of emission in thin layers measured as a function of concentration and (c) study of the effect of temperature on the emission yield and the form of the absorption spectra. The absorption spectra of rhodamine 6Zh and 3B are given in Figs 1-3 (aqueous solutions), Figs 3, 9 and 10 (alcohol solutions) and Fig 8 (glycerine solutions). The ratios of the emission intensity to the concentration in thin layers of solutions are given in Figs 4, 5 and 11, while the temperature dependences of the luminescence yields are given in Figs 6, 7. The following conclusions are deduced from the experimental data reported in the paper. Quenching of luminescence in rhodamine solutions consists mainly of quenching by transfer of excitation energy from a monomer to non-luminescing associates and of

Investigation of the Nature of Concentration Quenching of Luminescence of Dyes in Various Solvents and Separation and Classification of the Various Types of Quenching

quenching due to non-active absorption. Transfer of excitation energy from one monomer to another rarely quenches luminescence, but such a transfer may be an intermediate stage of migration of energy from excited monomers to dimers. Transfer of energy from one monomer to another causes depolarization of luminescence. The authors thank L.V. Krotova for carrying out some experiments and O.V. Shalayeva for measurement of duration of luminescence of solutions. There are 11 figures, 3 tables and 19 references, 13 of which are Soviet, 3 German and 3 French.

SUBMITTED: March 24, 1958

Card 3/3

SOV/51-6-3-14/28

AUTHORS: Levshin, V.L., Gutan, V.B. and Karzhavina, E.N.

TITLE: On the Possibility of Recombination Processes in Luminescence of Tungstates and Uranyl Compounds (O vozmozhnosti rekombinatsionnykh protsessov svecheniya v vol'framatakh i uranilovykh soyedineniyakh)

PERIODICAL: Optika i Spektroskopiya, 1959, Vol 6, Nr 3, pp 372-376, (USSR)

ABSTRACT: This paper was presented at the Seventh Conference on Luminescence in July 1958. The authors describe their studies of luminescence of uranyl silicate (UO_2SiO_3) and calcium tungstate ($CaWO_4$). The apparatus used was developed by a group of engineers working at the Physics Institute imeni P.N. Lebedev at the Ac. Sc. USSR, who were directed by A.G. Zavrazhin and amongst whom was E.N. Karzhavina. This apparatus made it possible to study luminescence of phosphors excited with electrons or with light between - 185 and + 300°C. Both substances were free from impurities. $CaWO_4$ was prepared by Yu.S. Leonov

Card 1/3 of FIAN. The phosphors were irradiated with a 10^{-7} A/cm^2,

On the Possibility of Recombination Processes in Luminescence of Tungstates and Uranyl Compounds

14 kV beam of electrons for 30 minutes at - 185°C. When cathodoluminescence died away completely the phosphors were heated at the rate of 10 deg/min. The resultant thermal de-excitation (thermoluminescence) curves are shown in Figs.1 (UO_2SiO_3) and 3 ($CaWO_4$). Electron-irradiated, thermally de-excited and subsequently photoexcited at 366 and 312 mμ, calcium tungstate also exhibited thermoluminescence (Fig.4). Photoexcitation of $CaWO_4$, which was not previously electron-irradiated, and photoexcitation of UO_2SiO_3, whether electron-irradiated or not, did not produce any thermo-luminescence. The intensities of thermoluminescence were of the order of several per cent compared with cathodo-luminescence. Cathodoluminescence of both substances decayed hyperbolically at - 185°C (Figs.5,6). The observed thermoluminescence and the hyperbolic decay of cathodoluminescence are ascribed to disturbance of the crystal lattice by the electron beam with resultant formation of centres at which electrons can be localised.

Card 2/3 Cathodoluminescence is due to recombination of all the

On the Possibility of Recombination Processes in Luminescence of Tungstates and Uranyl Compounds

trapped electrons liberated from shallow levels, and thermo-luminescence is due to the electrons freed from deeper levels. There are 6 figures and 4 references, of which 2 are Soviet, 1 German and 1 English.

SUBMITTED: March 27, 1958

Card 3/3

SOV/51-7-2-14/34

AUTHORS: Levshin, V.L. and Rebane, V.N.

TITLE: A Comparative Study of Light-Sum Storage and Temperature Quenching in a ZnS-Ag Phosphor Excited with β-Rays and Light (Sravnitel'noye izucheniye zapasaniya svetovykh summ i temperaturnogo tusheniya fosfora ZnS-Ag pri vozbuzhdenii β-luchami i svetom)

PERIODICAL: Optika i spektroskopiya, 1959, Vol 7, Nr 2, pp 236-240 (USSR)

ABSTRACT: The paper was presented by M.D. Galanin at the VII-th All-Union Conference on Luminescence on July 1, 1958, in Moscow. The paper reports a study of thermoluminescence and temperature quenching of the phosphor ZnS-Ag-$MgCl_2$ (10^{-4} g/g of Ag and 10^{-2} g/g of $MgCl_2$) excited by means of light and β-rays. The phosphors were heated to 800°C in air before measurements; they were prepared by V.I. Shchayenko. A mercury lamp PRK-4 was used in photo-excitation; the 365 mμ line was separated out by means of a filter. Beta-particles were from the following sources: P^{32} (maximum β-energy E = 1.7 MeV, mean energy $\bar{E}$ = 0.7 MeV), Tl^{204} (E = 0.783 MeV, $\bar{E}$ = 0.261 MeV) and S^{35} (E = 0.167 MeV and $\bar{E}$ = 0.055 MeV). The phosphor was used in the form of a layer 0.25 mm thick. It was excited with light or with β-rays at the liquid-nitrogen temperature, the excitation then ceased and the phosphor was kept in darkness for 1 min. Next the phosphor was heated at the rate

A Comparative Study of Light-Sum Storage and Temperature Quenching in a ZnS-Ag Phosphor Excited with β-Rays and Light

of 15 deg/min. The intensity of luminescence of the phosphor was recorded by means of a photomultiplier FEU-19 and a microammeter M-91. Two peaks were observed on the thermoluminescence curve of the photo-excited phosphor (Fig 1a); these peaks were at -150 to -165°C and at -75 to -80°C. The β-excited phosphor (Fig 1β-2) exhibited the same peaks. It follows, therefore, that for both types of excitation the same system of local levels was obtained. Filling of these levels depended on the type of excitation: when photo-excited the shallow levels were filled to a greater extent than deep levels, and on β-excitation the reverse was true. Filling of the local levels depends strongly on the intensity and duration of excitation. It was found that when the photo-excitation intensity was reduced by a factor of 10^4 (from 30 to 0.003 $\mu W/cm^2$) the rate of filling of the levels was the same on photo-excitation and on β-excitation from a 5.7 millicurie P^{32} source (Fig 3). It follows, therefore, that the peculiarities of β-excitation are entirely due to the low intensity of β-rays. Calculations showed that both a 0.003 $\mu W/cm^2$ light beam and a β-beam from a 5.7 millicurie P^{32} source deliver energy to the surface layer of the phosphor at the same rate of

A Comparative Study of Light-Sum Storage and Temperature Quenching in a ZnS-Ag Phosphor Excited with β-Rays and Light

~10^{13} eV $cm^{-3}sec^{-1}$. The authors studied also the temperature quenching on photo- and β-excitation (Fig 4). It was found that at low excitation intensities the temperature quenching begins at lower temperatures than it does at higher excitation intensities. The temperature quenching curve recorded on excitation with β-rays from a 30 millicurie P^{32} source (dashed curve in Fig 4) is almost identical with the quenching curve obtained on photo-excitation at the rate of 0.3 μW/cm^2. Acknowledgment is made to M.D. Galanin for his interest. There are 4 figures and 3 references, 1 of which is Soviet and 2 English.

SUBMITTED: September 2, 1958

Card 3/3

SOV/51-7-4-15/32

AUTHORS: Levshin, V.L. and Orlov, B.M.

TITLE: Investigation of the Energy of Thermal Activation of the Optical Flash in ZnS-Cu,Pb Phosphors

PERIODICAL: Optika i spektroskopiya, 1959, Vol 7, Nr 4, pp 530-536 (USSR)

ABSTRACT: The authors investigated the energy of thermal activation of flashes from localization levels of various depths in the ZnS-Cu,Pb phosphor stimulated with light of various wavelengths. It is known that the ZnS-Cu,Pb phosphor has three luminescence bands: one blue and two green. The more important properties of this phosphor were dealt with in several earlier papers (Refs 2-5). The authors used ZnS-Cu,Pb with 5% Pb, 10^{-5} g/g Cu and 4% NaCl. The phosphor was excited at -190°C and heated to +140°C at the rate of 0.2 deg C/sec. The thermal de-excitation curve in Fig 1a shows that the phosphor has two systems of capture levels: one of them corresponds to a sharp peak at -125°C (shallow levels) and the other produces a wide band between +30° and +140°C, with a maximum between +50 and +80°C (deep levels). Irradiation with $\lambda = 1.3\ \mu$ at -190°C (after excitation) empties the shallow levels, but the deep levels are practically unaffected. Irradiation with $\lambda = 0.8\ \mu$ light at -190°C empties both systems of levels. Thermal

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Investigation of the Energy of Thermal Activation of the Optical Flash in ZnS-Cu,Pb Phosphors

de-excitation of the phosphor excited at +20°C and irradiated with λ = 1.3 μ light shows that both systems of localization levels are emptied, but de-excitation is not complete. If the phosphor subjected to 1.3 μ irradiation is illuminated with λ = 0.8 μ wavelength, a bright flash is produced suggesting that the phosphor has at least one more system of deep levels in addition to those mentioned above. To study the activation energy of shallow levels several series of experiments were carried out. Fig 3 shows that log I, where I is the flash intensity, is a linear function of 1/T, where T is the absolute temperature; curves 1 and 2 represent de-excitation with λ = 0.8 μ and 1.3 μ respectively. From the slope of the straight lines in Fig 3 and those obtained using other de-exciting wavelengths between 0.7 and 1.4 μ, the value of the activation energy of shallow levels was found to be 0.039 ± 0.002 eV. Experiments carried out between +20° and +70°C showed that the energy of thermal activation is a function of the wavelength of the de-exciting light. This indicates that there are several types of deep levels with different activation energies. For the deepest level, which is not emptied by the infrared light of 1.3 μ wavelength, the activation energy was found to be 0.188 ± 0.004 eV. Further experiments dealing with shallow levels showed that at a fixed temperature the flash does not

Investigation of the Energy of Thermal Activation of the Optical Flash in ZnS-Cu,Pb Phosphors

occur instantaneously but after ~40 sec from beginning of optical de-excitation (Fig 4). It means that, instead of a flash, secondary phosphorescence is observed. This phosphorescence arises as follows: infrared rays produce transitions of localized electrons to another system of shallow levels and then the latter levels are thermally de-excited by thermal motion producing the flash. The authors recorded also the following spectra of the ZnS-Cu,Pb phosphor at various temperatures: luminescence during excitation (Fig 5a), phosphorescence (Fig 5б) and flash (Fig 5в). Fig 5a shows that at -196°C and -150°C blue luminescence with a maximum at 465 mμ is strong; it falls with temperature and at +70°C the 465 mμ maximum disappears. A second maximum in Fig 5a lies at 520 mμ at -196°C and it is due to copper. On increase of temperature this maximum rises and is displaced towards longer wavelengths. Increase of temperature produces also a rise of intensity at the long-wavelength end of emission, which may be due to

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Investigation of the Energy of Thermal Activations of the Optical Flash in ZnS-Cu,Pb Phosphors

a new band with a maximum at 550 mμ which represents emission by lead. Fig 5б shows that phosphorescence in the long-wavelength region is similar in form to fluorescence of Fig 5a. In the short-wavelength region phosphorescence is much weaker than fluorescence. Fig 5в represents the flash spectra at +20°C (curve 1) and -190°C (curve 2). Both these spectra are similar and they represent green emission of copper and lead with a maximum at 520 mμ; there is hardly any blue emission. There are 6 figures, 2 tables and 6 references, 4 of which are Soviet and 2 English.

SUBMITTED: January 12, 1959

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SOV/62-59-9-9/40

5(4)

AUTHORS: Levshin, V. L., Mamedov, Kh. I., Sergiyenko, S. R., Pustil'nikova, S. D.

TITLE: Fluorescence Spectra of Aromatic Hydrocarbons of the Diphenyl Series and Their Oxygen- and Sulfur Containing Analogs

PERIODICAL: Izvestiya Akademii nauk SSSR. Otdeleniye khimicheskikh nauk, 1959, Nr 9, pp 1571-1578 (USSR)

ABSTRACT: Petroleum fractions of high molecular weight can be analyzed with fluorescence spectra, but the spectra of the individual components of the fractions are not well enough known, so that there is a lack of comparative information to interpret the spectra. It is the aim of this paper to carry out further investigations in this field. The authors investigated the spectra of the hydrocarbons of the homologous series of biphenyls starting with diphenyl itself. The further compounds extend the aliphatic chain, introduced between the benzene rings, to pentane. A type of compounds was also investigated in which one CH_2-group of the aliphatic chain is replaced by oxygen or sulfur. The table shows structure and properties of the nine

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Fluorescence Spectra of Aromatic Hydrocarbons of the Diphenyl Series and Their Oxygen- and Sulfur Containing Analogs

compounds investigated. The fluorescence spectra of the compounds solved in isooctane were recorded at room temperature and at the temperature of liquid nitrogen. The spectra were examined with a quartz spectrograph of the ISP-66-type. The synthesis of the substances investigated is described. The spectra of the individual compounds are represented on figures 1-8. The influence of the elongation of the aliphatic bridge makes itself felt by the strong splitting up of the spectral bands. The spectrum is markedly more intense at low temperatures and may be used for analyzing the substances. The luminiscence spectrum changes considerably when an oxygen- or sulfur atom is introduced. At strongly marked π-electron bonds between the two benzene rings, the spectrum is shifted toward the longer-wave range at low temperatures as compared to spectra at room temperature. There are 8 figures, 1 table, and 7 references, 4 of which are Soviet.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova fizicheskiy fakul'tet (Moscow State University imeni M. V.

SOV/62-59-9-9/40

Fluorescence Spectra of Aromatic Hydrocarbons of the Diphenyl Series and Their Oxygen- and Sulfur Containing Analogs

Lomonosov, Physics Department)
Institut nefti Akademii nauk SSSR (Petroleum Institute of the Academy of Sciences, USSR)

SUBMITTED: December 20, 1957

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SOV/48-23-1-3/36

24(7)

AUTHORS: Levshin, V. L., Klyuyev, Yu. A.

TITLE: Formation of Luminescence Polymers in Concentrated Acridine-orange Solutions and Investigation of Their Optical Properties (Obrazovaniye lyuminestsentnykh polimerov v kontsentrirovannykh rastvorakh akridinovogo oranzhevogo i issledovaniye ikh opticheskikh svoystv)

PERIODICAL: Izvestiya Akademii nauk SSSR. Seriya fizicheskaya, 1959, Vol 23, Nr 1, pp 15-18 (USSR)

ABSTRACT: In this paper the flare of concentrated acridine-orange solutions in solid sugar congealments was studied at +20 and -183°. Associates are produced in them, and there is a long flare that corresponds to forbidden transitions. The acridine-orange concentration was modified within the range 10^{-5} - 10^{-2} g/g. It was excited with the mercury line 436-mμ at a complete absorption. Figures show: 1) the fluorescence spectra of the congealments colored by acridine-orange at 20° and various concentrations; 2) the spectra of α phosphorescence at 20°; 3) the spectra of β phosphorescence at -183° and those of aqueous acridine-orange solutions at 20°. The first spectrum

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Formation of Luminescence Polymers in Concentrated Acridine-orange Solutions and Investigation of Their Optical Properties

shows a stepwise fading of the green of monomeric bands and a simultaneous development of the yellow band of the associate. The second spectrum (α phosphorescence) corresponds almost completely to the first, however, the suppression of the α band is accompanied by the development of a long flare of dimers. The dimers pass to the triplet state. At -183°, the β process develops (long period of radiation). With growth of the coloring concentration, dimers are formed which are capable of phosphorescence. This is in accordance with the results obtained by Zanker (Ref 4). According to the data of the investigation the following conclusions are drawn: 1) There is no difference in the concentration extinction of the various flares in the congealments. 2) The occurrence of α phosphorescence at 20° and β phosphorescence at -183° are very similar to each other. From the investigations carried out with aqueous acridine-orange solutions it results that more dimers are produced in it than in the congealments. There are 4 figures, 1 table, and 7 references, 4 of which are Soviet.

BACHINSKIY, Aleksey Iosifovich, prof. [deceased]; LEVSHIN, V.L., otv. red.; KUZNETSOVA, Ye.B., red.izd-va; BRUZGUL', V.V., tekhn.red.

[Selected works] Izbrannye trudy. Moskva, Izd-vo Akad.nauk SSSR, 1960. 274 p. (MIRA 13:4)
(Thermodynamics)

LEVSHIN, V.L.

PHASE I BOOK EXPLOITATION SOV/4443

Akademiya nauk SSSR. Komissiya po analiticheskoy khimii

Metody opredeleniya primesey v chistykh metallakh (Methods of Determining Admixtures in Pure Metals) Moscow, 1960. 411 p. (Series: Its: Trudy, 12) 3,500 copies printed.

Resp. Eds.: A.P. Vinogradov, Academician, and D.I. Ryabchikov, Doctor of Chemical Sciences; Ed. of Publishing House: M.P. Volynets; Tech. Ed.: T.V. Polyakova.

PURPOSE: This collection of articles is intended for chemists, metallurgists, and engineers.

COVERAGE: The articles describe methods for detecting and determining various admixtures or their traces in pure metals. Also discussed are many chemical, physicochemical, electrochemical, spectrochemical and luminescence methods of analyzing materials of high purity. The editors state that these methods have been developed within the last five or six years by various Soviet scientific institutes, and are now widely used in research and factory laboratories of the Soviet Union. No personalities are mentioned. References, mostly Soviet, accompany each article.

AVAILABLE: Library of Congress

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S/030/60/000/009/011/016
B021/B056

AUTHOR: Levshin, V. L., Doctor of Physical and Mathematical Sciences

TITLE: The Investigation of the Luminescence of Crystal Phosphors

PERIODICAL: Vestnik Akademii nauk SSSR, 1960, No. 9, pp. 107 - 109

TEXT: The Ninth Conference on Luminescence was organized by the Sovet po lyuminestsentsii Akademii nauk SSSR (Council for Luminescence of the Academy of Sciences, USSR), Kiyevskiy universitet (Kiyev University), and the Akademiya nauk USSR (Academy of Sciences UkrSSR) from June 20 to June 25, 1960 at Kiyev and dealt with the luminescence of crystal phosphors. 120 reports were heard. Besides research workers from Moscow, Leningrad, Tartu, Kiyev, and Irkutsk, it was attended by delegates from new scientific centers in Tashkent, Baku, Riga, and Gor'kiy. The investigation of the luminescence centers in crystals of the cubic system are developed mainly in Leningrad (Ye. F. Gross, A. A. Kaplyanskiy, P. P. Feofilov) and that of alkali-halide crystals in Tartu (F.D.Klement, Ch. B. Lushchik). At the laboratory A. F. Prikhot'ko of the Academy of

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The Investigation of the Luminescence of Crystal Phosphors

S/030/60/000/009/011/016
B021/B056

Sciences UkrSSR, the luminescence of impurity centers was investigated (survey by M. T. Shpak). Scientists from Moscow and Leningrad (V. V. Antonov-Romanovskiy, V. L. Levshin, N. A. Tolstoy, V. F. Tunitskaya, M. V. Fok) investigated the kinetics of luminescence, the energy transformation in matter, and the energy transmission in phosphors. Research work in connection with alkali-halide phosphors developed, besides in Tartu, also at Irkutsk (I. A. Parfianovich), Saratov (M. L. Kats), and Baku (A. Kh. Khalilov). Little research work has as yet been carried out of silicates, phosphates, and other kinds of luminophores at the Gosudarstvennyy institut prikladnoy khimii (State Institute of Applied Chemistry), Fizicheskiy institut im. P. N. Lebedeva (Institute of Physics imeni P. N. Lebedev). Considerable success in the field of the synthesis of luminophores was obtained by A. A. Bundel' and M. A. Konstantinova. Reports on cathodic luminescence were given by B. M. Nosenko, M. D. Galanin, A. N. Zaydel', and M. U. Belyy. M. A. Bonch-Bruyevich, A. N. Georgobiani, and V. N. Favorin spoke about electroluminescence. Microscopic observations of luminescence were dealt with by V. Ye. Oranovskiy. The luminescence of cuprous oxide was dealt with by collaborators of Kiyev University I. S. Gorban', S. N. Ryzhova,

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S/051/60/008/005/011/027
E201/E491

24.3500

AUTHORS: Levshin, V.L. and Tunitskaya, V.F.

TITLE: Thermal De-excitation and Localization Levels of ZnS-Mn Phosphors

PERIODICAL: Optika i spektroskopiya, 1960, Vol.8, No.5, pp.663-671

TEXT: A series of ZnS-Mn phosphors was studied in a wide range of temperatures using exciting light of various wavelengths and intensities. The first part of this investigation is reported in the present paper which deals with the structure, population and thermal de-excitation (emptying) of capture levels in ZnS-Mn crystals of cubic modification. The effect of increasing manganese concentration on the spectrum of the levels was studied, as well as the effect of the excitation wavelengths on the population of the levels. The phosphors were prepared by heating a charge in a stream of nitrogen at 850°C for 30 min. Manganese was introduced in the form of MnCl and its initial concentration in the charge was from 10^{-6} to 3×10^{-2} g/g. About 40% of Mn was lost during firing. X-ray diffraction studies showed that all samples had sphalerite structure. Some of the results are presented in

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Thermal De-excitation and Localization Levels of ZnS-Mn Phosphors

Fig.1 to 7 and Tables 1 to 3. Fig.1 and 2 show the thermoluminescence (thermal de-excitation) curves for phosphors prepared at various temperatures (Fig.1) and with various amounts of manganese (Fig.2). Fig.3 and 4 and Tables 1 and 2 give the analysis of peaks I, II and III in thermoluminescence curves. Fig.5 and 6 show the light sums of blue, manganese and total luminescence as a function of the concentration of manganese. Fig.7 shows the thermoluminescence curves of ZnS (Fig.7a) and of ZnS with 10^{-3} g/g Mn (Fig.7b) excited with light of 312 (curves 1), 366 (curves 2) and 436 mμ (curves 3). The reduction of thermoluminescence light sums when the phosphors were excited with light of 436 mμ wavelength (compared with excitation using 312 and 366 mμ light) is illustrated in Table 3. The following conclusions were drawn from the results: (1) Manganese itself does not produce new localization levels which would appear in thermoluminescence peaks above 80°K. Only a small number of Mn ions remains near places where electrons are localized by oxygen and these Mn ions deepen the oxygen localization levels producing a new peak at -30°C.

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Thermal De-excitation and Localization Levels of ZnS-Mn Phosphors

Formation of this new peak is accompanied by a reduction of the oxygen peak at -90°C. (2) The quantum light sums of ZnS-Mn with up to 6 x 10^{-3} g/g Mn are practically independent of the concentration of Mn. In such phosphors radiationless transitions of electrons from localization levels do not occur on thermal de-excitation. (3) Light of 312 and 366 mμ wavelengths does not affect localized electrons and produces similar light sums on thermal de-excitation. If light of $\lambda = 436$ mμ is used, the light sums are reduced by factor of 3 and this reduction is stronger in the case of the blue luminescence compared than for orange luminescence; luminescence due to shallow levels is weakened to a greater extent than luminescence due to deep levels. (4) Increase of the amount of Mn reduces the depth of electron localization levels. (5) The profile of the high-temperature thermoluminescence peak suggests that only infrequently electrons are recaptured by localization levels during the process of thermoluminescence. Acknowledgments are made to A.V.Lavrov for preparation and analysis of the phosphors and to O.M.Agafonova for

S/051/60/008/06/020/024
E201/E691

24.3500

AUTHORS: Levshin, V.L. and Fayzi, N.Kh.

TITLE: Investigation of the Thermal Activation Energy of a [Luminescence] Flash and the Localization Levels in CaS-Based Phosphors

PERIODICAL: Optika i spektroskopiya, 1960, Vol 8, Nr 6, pp 875-877 (USSR)

ABSTRACT: The thermal activation energy of a luminescence flash is that energy (supplied by the thermal vibrations of the lattice) which is necessary to transfer electrons from deep localization levels to more shallow ones so that they produce a flash when stimulated with infrared light. The following phosphors were investigated: CaS; Ca-Sm(3×10^{-5}); CaS-Cu(2.3×10^{-4}); CaS-Bi(3×10^{-5}); CaS-Bi(3×10^{-5}),Ce(1.4×10^{-4}); CaS-Bi(3×10^{-5}),Eu(1.3×10^{-4}); CaS-Bi(3×10^{-5}),Pr(1.4×10^{-4}); CaS-Sm(3×10^{-5}),Cu(2.3×10^{-4}); CaS-Sm(3×10^{-5}),Ce(10^{-4}). The phosphors were prepared from $CaCO_3$ which was heated to 1000°C to form CaO. Na_2SO_4 flux was used in the amount of 4%. The temperature and duration of final calcination were 1050°C and 25 min. The luminescence flash and thermoluminescence were investigated using apparatus described earlier (Ref 5). Thermoluminescence curves are given in a figure on

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Investigation of the Thermal Activation Energy of a [Luminescence] Flash and the Localization Levels in CaS-Based Phosphors

p 876; they show the effect of activators on formation of localization levels. To study the luminescence flash the authors used the phosphors CaS-Sm,Cu and CaS-Sm,Ce whose flashes had low inertia and which had negligible secondary phosphorescence. These two phosphors had five localization levels, the most important of which were those represented by thermoluminescence peaks at +30°C and 150°C. To find the thermal activation energy, ΔE, of the +150°C level of CaS-Sm,Cu the phosphor was excited for 10 min at +80°C; to find ΔE of the +30°C levels of CaS-Sm,Cu and CaS-Sm,Ce the phosphors were excited at +7-10°C. Then the flashes were stimulated at various temperatures with infrared radiation of 0.8-1.2 μ wavelengths. The thermal activation energy of the flash was found from:

$$\lg \frac{I_o}{I_b} = 0.43 \frac{\Delta E}{kT}, \qquad (2)$$

where I_b/I_o is the relative luminance of the flash at a temperature T.

Card 2/3

LEVSHIN, V.L.

"Polarized luminescence of atoms, molecules, and crystals" by P.P. Feofilov. Reviewed by V.L.Levshin. Opt.i spektr. 9 no.1:132-133 Jl '60. (MIRA 13:7)
(Luminescence) (Feofilov, P.P.)

S/051/60/009/002/002/006
E201/E691

AUTHORS: Levshin, V.L. and Tunitskaya, V.F.

TITLE: The Luminescence Processes and their Kinetics in ZnS-Mn Phosphors During Excitation

PERIODICAL: Optika i spektroskopiya, 1960, Vol. 9, No. 2, pp. 223-232

TEXT: In an earlier paper (Ref 1) the authors dealt with thermal deexcitation and the origin of localization levels in ZnS-Mn phosphors. The present paper extends this work to luminescence of the same phosphors under excitation. The phosphors were in the form of ~3.7 μ thick layers (with grain diameter of ~1 μ) and were excited with 365 and 312 mμ lines from a mercury lamp; the quantum intensities of the lines were equalized with filters. The intensity of luminescence was measured with a photomultiplier FEU-32. The author studied the effect of temperature on the absorption spectra (Figs. 1, 2) and on the blue and orange luminescence of the phosphors (Figs. 3-6). The information obtained is used to discuss the processes of transformation of the excitation energy into blue luminescence, manganese luminescence and heat, as a function of the ambient temperature and the concentration of manganese.

Card 1/2

ARAPOVA, E.Ya.; BARANOVA, Ye.G.; LEVSHIN, V.L.; TIMOFEYEVA, T.V.; TROFIMOV, A.K.; FEOFILOV, P.P.

Luminescent method of quantitative determination of gadolinium in metallic beryllium. Trudy Kom. anal. khim. 12:344-354 '60. (MIRA 13:8)

(Beryllium--Analysis) (Gadolinium earths)

LEVSHIN, V.L.; ARAPOVA, E.Ya.; BARANOVA, Ye.G.

Determining small quantities of gadolinium, samarium and europium in metallic thorium. Trudy Kom. anal. khim. 12:393-408 '60. (MIRA 13:8)

(Thorium--Analysis) (Rare earth metals)

BARANOVA, Ye.G.; LEVSHIN, V.L.

Nature of the bonding forces in associated molecules of rhodamine 3B and rhodamine 6G in aqueous solutions and the effect of concentration and temperature on migration extinction. Opt.i spektr. 10 no.3:362-367 Mr '61. (MIRA 14:8)

(Chemical bonds) (Molecular association) (Rhodamines)

LEVSHIN, V.L.; RYZHIKOV, B.D.

Yield and other optical properties of zinc sulfide phosphors as a function of the size of uncruched crystals. Opt. i spektr. 10 no.4:505-511 Ap '61. (MIRA 14:3)
(Zinc sulfide—Optical properties)

LEVSHIN, V.L.

Note on the concepts "yield," "mean duration," and "damping law" of luminescence and their application. Opt. i spektr. 11 no.3:362-368 S '61. (MIRA 14:9)
(Luminescence—Terminology)

32051
S/051/61/011/005/011/018
E202/E192

24.3500 (1137,1138)

AUTHORS: Drozd, L., and Levshin, V.L.

TITLE: Disposition of the energy levels of the ZnS-CdS phosphors

PERIODICAL: Optika i spektroskopiya, v.11, no.5, 1961, 648-655

TEXT: This work is the continuation of earlier studies in this field (Ref.1: L. Drozd, Izv.AN SSSR, ser. fiz., v.23, 1300, 1959. Ref.2: L. Drozd, V.L. Levshin, Opt. i spektr. v.10, 773, 1961). The same phosphors and the same apparatus were employed. By plotting the spectra of ZnS-CdS (for varying concentrations of CdS from 0 - 15 wt.%) at room temperature, excited by the light of the 365 and 313 mμ lines, it was found that the shapes of the spectra were independent of the exciting wavelengths and it was therefore concluded that all the light in all these phosphors belonged to only one emission centre and all the bands were of the simple type. However, when the same phosphors were excited by 313, 365 and 436 mμ lines at -195 °C, and the resulting spectra plotted, there was evidence of two bands. The intensity of band II grew rapidly with the increasing Cd content, until the

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Disposition of the energy levels ...

concentration of CdS exceeded 50%, when it started to decrease. The relative development of band II, as compared with band I, depended on the wavelength of the exciting light. It was concluded that the level of luminescence centres of band II was very close to the valency zone, and that band II had a separate centre of luminescence in the vicinity of which there was a quantity of CdS. All these phosphors showed minimum intensity of luminescence at approximately 12% of CdS, and a maximum intensity at approximately 50%. In this respect, these phosphors resembled closely the ZnS-CdS-Cu system studied earlier by V.L. Levshin (one of the present authors) and S.A. Fridman (Ref.14; ZhFKh, v.8, 1277, 1935). The authors have also measured the width of the forbidden gap, and the curves of the thermal luminescence decay for various concentrations of CdS. On the basis of these data and the earlier results, a mechanism of the energy levels of the non-activated ZnS-CdS was developed and is shown in Fig.5. A.A. Bundel' and A.I. Rusanova are mentioned in the article in connection with their contributions in this field. There are 5 figures, 1 table and 18 references: 10 Soviet-bloc and 8 non-Soviet-bloc.

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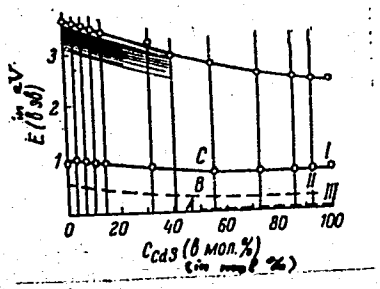
E202/E192

Disposition of the energy levels ...

The English language references read as follows:
Ref.5: P.F. Brown, J. Electronics, v.2, 154, 1956.
Ref.7: J.S. Prener, D.J. Weil. J.Electrochem.Soc., v.106, 409, 1959.

SUBMITTED: December 12, 1960

Fig.5. Scheme of localisation levels of electrons and holes in the ZnS-CdS phosphors.



Position of the levels of phosphors with varying CdS contents are read off the ordinate axis.
Vertical lines correspond to the studied phosphors; their levels were used in constructing the scheme.
Y-axis: E in eV;
X-axis: concentration of CdS in mol.%.

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S/048/61/025/003/019/047
B104/B214

9.4170
24.3500 (1137, 1138, 1395)

AUTHORS: Levshin, V. L. and Ryzhikov, B. D.

TITLE: The effect of the size of natural and broken crystals on the luminescence of zinc sulfide phosphors

PERIODICAL: Izvestiya Akademii nauk SSSR. Seriya fizicheskaya, v. 25, no. 3, 1961, 362-364

TEXT: This paper was read at the Ninth Conference on Luminescence (Crystal Phosphors) held in Kiyev from June 20 to June 25, 1960. A study was made of the effect of the size of mechanically broken crystals of zinc sulfide on their luminescence properties. Fig. 1 shows the dependence of the luminescence intensity of the fraction of ZnS-Sm phosphors on the dimensions of unbroken (Curve 1) and broken (Curve 2) crystals. Further experiments showed a large influence of the wavelength of the exciting light upon the dependence of brightness on the size of the crystals. As the difference between the two curves can be explained only as due to structural changes arising from the mechanical treatment, an X-ray diffraction study was carried out. The existence of inner deformations

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of the crystal lattice can be clearly inferred from the changes in the diffraction pattern. The dependence of the line broadening in the Debye powder pattern on the grain size of the broken luminophores and the change of its intensity, as well as the decrease of the luminescence brightness have a complicated nature. The changes in luminescence are explained as follows: The symmetry of the field in the crystal lattice is perturbed due to lattice deformations in the neighborhood of the activator atoms; this causes perturbations in the potential curves of the upper and lower states. If the two curves intersect, there results an extinction of the inner luminescence centers. Further, the larger the change in the brightness of luminescence on mechanical breaking of the crystals, the larger are the changes in the luminescence spectrum. An increasing effect of temperature on luminescence is also found. Assuming that the luminescence properties are changed by lattice deformations, Fig. 2 gives the level schemes of an undeformed crystal (a) and a deformed crystal (b). It is assumed in first approximation that the change in the depth of the trapping levels is proportional to the changes in the forbidden band widths. In the discussion following the paper A. M. Gurvich reported briefly on experiments carried out with

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(Zn , Cd)S-Ag luminophores (average size about 30μ) which confirm the ideas of the present authors. There are 2 figures and 2 references: 1 Soviet-bloc.

ASSOCIATION: Kafedra optiki Fizicheskogo fakul'teta Moskovskogo gos. universiteta im. M. V. Lomonosova
(Department of Optics of the Division of Physics, Moscow State University imeni M. V. Lomonosov)

20845

S/048/61/025/003/034/047
B104/B202

9,4160 (also 1137,1395)

AUTHORS: Levshin, V. L., Voronov, Yu. V., Rutan, V. B., Fridman, S.A., and Shchayenko, V. V.

TITLE: Study of the effect of double activation with silver and samarium on the localization levels and the emission of zinc sulfide phosphors

PERIODICAL: Izvestiya Akademii nauk SSSR. Seriya fizicheskaya, v. 25, no. 3, 1961, 392-399

TEXT: This paper was presented at the 9th conference on luminescence (crystal phosphors), Kiyev, June 20 to 25, 1960. It is the first of a series planned by the authors in which they study the interaction between Ag and Sm activators in ZnS-Ag,Sm phosphor. When producing the specimens 4% magnesium chloride was partially added as flux. The quantitative data given in the present paper were obtained from specimens to which fluxes had been added. The authors studied phosphors which had been activated only with silver or only with samarium and phosphors containing 10^{-7} 10^{-4} g/g Ag in which the samarium concentration was varied in the range 10^{-7} to

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Study of the effect of double...

10^{-3} g/g. Furthermore, they studied phosphors which contained 10^{-4} g/g samarium and 10^{-7} to 10^{-3} g/g silver. Ag gives a band with λ_{max} = 430 mμ. Sm gives three bands which have line character and which lie in the green, orange, and red spectral range. The most intense group lies at 650 mμ. The type of luminescence centers could not be explained by comparing the line intensities as functions of the composition. It is possible that only one type of luminescence centers exists which in the respective states of excitation give different bands. Using the formula

$$E = \frac{kT_1T_2}{T_2-T_1}\left(\ln\frac{\beta_2}{\beta_1} + 2\ln\frac{T_1}{T_2}\right) \qquad (1)$$

suggested by I. A. Parfianovich, where β_1 and β_2 the different heating velocities on thermal deexcitation, T_1 and T_2 the corresponding absolute temperatures of the peaks of thermal deexcitation studied, and E the energy depth of the peak, the authors obtain the following values for the depth of the localization levels of samarium:

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Study of the effect of double...

t, °C	-144	-90	-60	-10	+30	+70	+90
g, eV	0,26	0,37	0,43	0,53	0,61	0,69	0,73

The energy depth of silver levels is 0.33 ev. It may be concluded therefrom that new levels are formed due to the interaction of the activators and that this interaction reduces the light sum of the former levels. The increase of the number of activator ions which leads to a decrease of the light sum accumulated leads to the fact that traps which are produced by two neighboring activator ions are less efficient than those traps which are produced by an individual activator ion. Figs. 2 and 3 graphically represent the change of spectral composition of phosphor emission as depending on the ratio and the amount of the activators introduced. The diagrams of Fig. 4 show the temperature effect on the activator interaction. From the results obtained the authors conclude a mutual extinction in both activators which becomes particularly manifest if the two activator concentrations strongly differ. The complex temperature dependence of extinction indicates the existence of different types of luminescence centers. In the following discussion V. Ya. Yaskolko speaks about experiments with $CaSO_4$ phosphors activated with Mn, Sm, Pb, Zn, Bi, and

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B104/B201

24,3500

AUTHORS: Levshin, V. L. and Orlov, B. M.

TITLE: Study of the thermal activation energy of the optical extinction of some crystal phosphors

PERIODICAL: Izvestiya Akademii nauk, SSSR. Seriya fizicheskaya, v. 25, no. 4, 1961, 466-469

TEXT: The present paper has been read at the 9th Conference on Luminescence (Crystal Phosphors), Kiyev, June 20-25, 1960. The authors studied on three different phosphors the dependence of the thermal activation energy E of extinction on temperature: ZnS, ZnS-Co, and CaS-Bi. E was determined by the relation $2.3 \log \Delta S_T + B = -E/kT$, where $\Delta S_T = S_o - S_T = Ae^{-E/kT}$. S_o is the area bounded by the curve of thermal de-excitation, that has been drawn without prior extinction of the phosphor by means of infrared light, S_T is the area bounded by this curve, if drawn after extinction. For ZnS it was not possible to determine E, because of the slow change of S_T with temperature. The results for different wavelengths of the infrared light

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Study of the thermal...

are collected in Table 1. They show that for a given level E does not depend on λ_{ir}. E is the larger, the deeper the level. This also explains the increase of E with an enlargement of ΔS_T. The infrared light causes the maximum of thermal de-excitation to shift toward higher temperatures. Similar results had been obtained by the authors in a previous study (Ref. 3: Levshin et al., Optika i spektroskopiya 7, vyp. 4, 530 (1959)), when they determined the thermal activation energy of the scintillation of ZnS-Cu,Pb phosphors. In the ensuing discussion, Ch. B. Lushchik quoted well-known papers by V. V. Antonov-Romanovskiy and N. A. Tolstoi, where similar effects had been considered, and stated that the physical processes giving rise to the de-exciting effect of the exciting light are not clarified as yet. He mentioned several results yielded by similar studies conducted at Tartu. Thus, e.g., it has been found there that the diminution of F centers is caused not only by photothermal ionization, but also by a photothermal liberation of holes from the trapping levels, by ionization of the F centers by exciton collisions, etc. There are 2 figures, 1 table, and 3 references: 2 Soviet-bloc and 1 non-Soviet-bloc.

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Study of the thermal...

ASSOCIATION: Kafedra optiki fizicheskogo fakul'teta Moskovskogo gos. universiteta im. M. V. Lomonosova (Department of Optics of the Division of Physics, Moscow State University imeni M. V. Lomonosov)

Фосфор	λ=0,7μ	0,8 μ	0,9 μ	1,0 μ	1,1 μ	1,2 μ	1,3 μ	$E_{ср}$
ZnS	<0,02	<0,02	<0,02	<0,02	<0,02	<0,02	<0,02	<0,02
ZnS — Co (ΔS_T =15%)	—	0,092	0,105	0,096	—	0,096	0,101	0,098
ZnS — Co (ΔS_T =50%)	—	0,104	0,106	0,107	—	0,105	0,110	0,106
CaS — Bi	0,27	0,33	0,29	0,30	—	—	—	0,30

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22163

S/048/61/025/004/012/048
B104/B201

24,3500

AUTHORS: Levshin, V. L. and Pipinis, F. A.

TITLE: Study of the trapping levels of CaS phosphors by methods of excelectronic emission and thermal de-excitation

PERIODICAL: Izvestiya Akademii nauk SSSR. Seriya fizicheskaya, v. 25, no. 4, 1961, 471-472

TEXT: The present paper has been read at the 9th Conference on Luminescence (Crystal Phosphors), Kiyev, June 20-25, 1960. The authors used the exo-electronic emission in parallel to the thermal de-excitation to study the localized levels of crystal phosphors. They made use of a high-vacuum system permitting the drawing of curves of thermal de-excitation and exo-electronic emission at temperatures between -160°C and +300°C. During the experiments, the vacuum was kept within the range of $5 \cdot 10^{-7}$ and $5 \cdot 10^{-6}$ mm Hg. The phosphor was excited by cathode rays (6 kev), and, after excitation, the two curves were taken simultaneously. The electron emission was measured by an electron multiplier tube housed in the working piston. The

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Study of the...

multiplier signal was amplified by a broad-band amplifier and conveyed to a pulse integrator. It was possible by this system to study the localized levels of crystal phosphors on the basis of zinc sulfide, calcium sulfide, strontium sulfide, and some other alkali halide phosphors. Fig. 1 presents, as a graphic example, the thermal de-excitation L and the electron emission E of a CaS phosphor, activated with bismuth. The curves concerned were drawn after excitation with cathode rays at -160°C. All CaS phosphors lack the low-temperature maximum of electron emission, that is found in thermal de-excitation. This can be explained either by the hole-type nature of these levels, or by the fact that at very low temperatures no energy is consumed for the electron escape from the crystal. A 15-minute annealing at 1150°C in the air (Fig. 2) causes all maxima to shift by about 60°C toward higher temperatures. It is inferred from the close neighborhood of the upper maximum of L and that of E that in thermoluminescence, electrons escape from the same levels as in excemission. The slight difference between the two maxima is explained by the particular character of the two processes. There are 2 figures.

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ASSOCIATION: Kafedra optiki fizicheskogo fakul'teta Moskovskogo gos. universiteta im. M. V. Lomonosova (Department of Optics of the Division of Physics, Moscow State University imeni M. V. Lomonosov)

Legend to Fig. 1: L and E of a CaS-Bi (10^{-2} wt%) phosphor (heating 0.1 deg/sec)

Legend to Fig. 2: The same curves of the same phosphor after a 15-minute annealing at 1150°C in the air.

Fig. 1

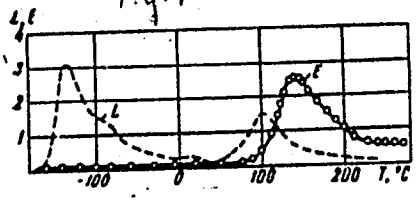
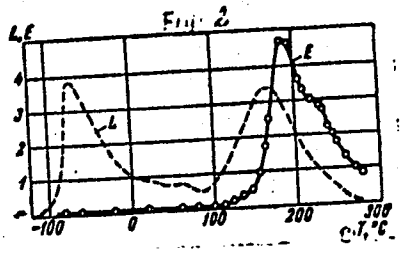


Fig. 2



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22165

S/048/61/025/004/014/048
B104/B201

24.3500

AUTHORS: Zhukova, N. V., Yevdokimova, G. K., and Levshin, V. L.

TITLE: Damping of phosphorescence as a function of the filling of electron localization levels and temperature

PERIODICAL: Izvestiya Akademii nauk SSSR. Seriya fizicheskaya, v. 25, no. 4, 1961, 476-478

TEXT: The present paper has been read at the 9th Conference on Luminescence (Crystal Phosphors), Kiyev, June 20-25, 1960. The authors wanted to study the filling of electron localization levels at different excitation temperatures of a phosphor, to establish a relationship between the damping of phosphorescence and the liberation of electrons of variously deep localization levels, and to clarify the part played by secondary localizations in the natural damping of the phosphor. The investigation covered specimens of phosphor ZnS-Cu($6 \cdot 10^{-5}$ g/g), Co(10^{-5} g/g), which has a wide band of thermal de-excitation with a temperature interval of 180°C and a maximum at 75°C. The specimens were excited by X-rays (366 mμ and

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... shown in
... levels of different

Damping of...

depths during the damping process. It has been finally possible to show the participation of a part of levels of a wide depth range in each damping stage. There are 2 figures and 3 references: 2 Soviet-bloc and 1 non-Soviet-bloc.

ASSOCIATION: Moskovskiy aviatsionnyy institut im. Sergo Ordzhonikidze (Moscow Aviation Institute imeni Sergo Ordzhonikidze)
Fizicheskiy fakul'tet Moskovskogo gos. universiteta im. M. V. Lomonosova (Division of Physics of Moscow State University imeni M. V. Lomonosov)

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22199
S/048/61/025/004/048/048
B117/B209

24,3500

AUTHOR: Levshin, V. L.

TITLE: Close of conference

PERIODICAL: Izvestiya Akademii nauk SSSR. Seriya fizicheskaya, v. 25, no. 4, 1961, 562-564

TEXT: The present paper was read at the close of the 9th Conference on Luminescence (Crystal Phosphors). The conference was attended by 325 delegates from a large number of scientific and industrial organizations. The lecturer emphasized the fact that in many lectures held on this conference much more attention than ever before was paid to the nature of the processes concerned. The application of new and more accomplished methods of investigation has already brought good success. The studies on structureless spectra with broad emission bands as well as of strongly scattering powders which were an obstacle to an exact examination of absorption, have been gradually replaced by studies with single crystals and sublimed foils. A detailed study of the action of impurity centers in organic crystals, which is closely related to the

Card 1/4

Close of conference

determination and examination of the fine structure of these spectra permitted detecting a similarity in the luminescent processes of organic luminophores and of inorganic crystal phosphors. Another characteristic distinguishing this conference was the tendency to explain the observed processes theoretically. However, these theoretical studies are usually too abstract, since they deal with idealized special cases. On the other hand, the calculations supplied by the theorists were not enough used by the experimenters. Nevertheless, there is hope that theoretical and experimental studies will join in a closer cooperation in the near future. The lecturer pointed out studies made on individual classes of crystal phosphors and emphasized the great achievements in the field of alkali halide phosphors. Less interest was paid to phosphors of the zinc sulfide type, although this class of luminophores had been the first to be studied in the USSR, and, moreover, it is very important in practice. Even less attention was paid to other luminophores. In the field of chemical investigations, stress was laid on the transition from empirical methods of production to the development of new and theoretically backed methods of synthesis, in which thermodynamic processes and the characteristics of the individual crystal structures are taken into account.

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B117/B209

Close of conference

The conference has shown that the character of research work in the field of luminescence has changed much. The stress which before was on purely technical and experimental investigations, with particular emphasis upon the production of sufficiently luminescent luminophores and upon the study of the fundamental properties of luminescence, has now shifted to the investigation of the nature of this phenomenon and to the kinetics of the processes taking place during luminescence. The lack of lectures on the practical use of crystal phosphors was called a deplorable shortcoming. Some approved fields of application have not been mentioned at all. D. P. Troshenskiy from the Moskovskiy elektrolampovyy zavod (Moscow Electric Bulb Factory) and V. I. Dolgopolov from the Vsesoyuznyy svetotekhnicheskiy institut (All-Union Institute of Light Engineering) advanced considerably different opinions regarding the measures to be taken to improve the luminescent tubes in their lectures on the use of luminescence for illumination. The lecturer suggested a better coordination of the work of industrial and scientific authorities and proposed to lay more stress upon the practical use of luminophores. Finally, he said that the conference had given a clear impression of the present state of the work in the field of crystal phosphor luminescence. He

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LEVSHIN, V.L.

Sergei Ivanovich Vavilov; on his 70th birthday. Usp.fiz.nauk 73 no.3:373-380 Mr '61. (MIRA 14:6)
(Vavilov, Sergei Ivanovich, 1891-)

S/053/61/075/002/002/007
B125/B102

AUTHOR: Levshin, V. L.

TITLE: Development of S. I. Vavilov's ideas in the field of luminescence

PERIODICAL: Uspekhi fizicheskikh nauk, v. 75, no. 2, 1961, 241-250

TEXT: This is a review of the further development of the theory of photoluminescence after the death of S. I. Vavilov and of the special fields of his research work. S. I. Vavilov studied the nature of the photoluminescence of solutions in the following three ways: 1) determination of the energy conversion coefficient in luminescence processes and of the causes changing the conversion efficiency of excitation energy; 2) study of the kinetics of these processes by investigating the durability and laws of afterglow damping; 3) study of the character of luminescence of molecules (which are compared with elementary radiation emitters) and of the kinetics of luminescence. Papers of the following Soviet authors were dedicated to these three fields: 1) P. P. Lazarev (Vavilov's teacher), B. I. Stepanov with his co-workers V. V. Antonov-Romanovskiy, M. A. Elentsev,

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Development of S. I. Vavilov's...

and M. V. Fok; B. Ya. Sveshnikov and Vavilov's pupil A. N. Sevchenko. Soviet papers during the last few years have confirmed the correctness of the association theory of concentration quenching; 2) L. A. Tumerman, V. V. Shimanovskiy, M. D. Galanin, Vavilov's pupil A. M. Bonch-Bruyevich, N. A Tolstoy, B. I. Stepanov, P. P. Feofilov, A. N. Sevchenko, and G. P. Gurinovich. S. I. Vavilov was particularly interested in the nature of elementary emitters; 3) S. I. Vavilov, A. N. Sevchenko, and M. D. Galanin. S. I. Vavilov's theory, which is based on extensive experimental material, explains the change of the luminescence yield as well as the change of the duration of luminescence and its depolarization. An inductive coupling between excited and non-excited molecules is also presupposed in this theory. M. D. Galanin developed a detailed theory, N. V. Zhevandrov found that the degree of polarization becomes independent of the direction of the electric vector of the exciting light due to energy transfer in a regular crystal lattice. The damping of luminescence is more complex. A. S. Davydov, A. F. Prokhot'ko and his collaborators at the Ukrainskaya AN (Ukrainskaya AS) as well as Ya. N. Frenkel', Ye. F. Gross, V. M. Arganovich, A. S. Selivanenko et al. have published theoretical papers in this field. Though a systematic investigation of crystal phosphors of certain semiconductors in the Soviet

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Development of S. I. Vavilov's...

Union was started 12 years later than the investigation of molecular luminescence, it is now the most important field of luminescence research. In addition to photoluminescence, cathode luminescence and electro-luminescence are also investigated in many Soviet laboratories. Papers on this subject were published by V. V. Antonov-Romanovskiy, A.M. Bonch-Bruyevich, M. V. Fok, A. N. Georgobiani, V. Ye. Ogranovskiy, V. N. Favorin, Z. L. Morgenshtern, and I. M. Rozman. In his research work S. I. Vavilov always tried to solve technical and economic problems. Of particular interest are his studies of luminescence analysis, which were continued by A. V. Karyakin, V. K. Matveyev, Ye. M. Brumberg, and M. N. Meysel'. Practical investigations were carried out by M. A. Konstantinova at the Fizicheskiy institut AN SSSR (Physics Institute AS USSR), and at GOI. S. I. Vavilov also headed the departments for luminescence tubes of FIAN, GOI, and VEI. This review does not comprise all the research work on luminescence done in the USSR. The great contribution made by the school of Academician A. N. Terenin and his pupil B. S. Neporent is pointed out. New large centers were established at Tartu (headed by F. D. Klement) where crystal phosphors are studied, at the Ukrainskaya Akademiya nauk (Ukrainian Academy of Sciences), Kiyev, at Kiyev University (headed by A. F. Pikhot'ko

Development of S. I. Vavilov's...

and Vavilov's pupil A. L. Shishlovskiy), and at the Belorusskaya AN (Belorusskaya AS) (headed by B. M. Stepanov and Vavilov's pupil A. N. Sevchenko). E. V. Shpol'skiy, Ye. F. Gross as well as research centers at Syktyvkar, Osh (Kirgiziya), Chita, and many cities in Siberia and [Soviet] Central Asia are also concerned with luminescence research. There are 4 figures.

S/051/62/012/002/012/020
E202/E192

AUTHORS: Levshin, V.L., and Pipinis, P.A.

TITLE: Development of the exoelectronic emission method for the investigation of trapping levels in crystallo-phosphors and its application to the study of the trapping levels of CaS and SrS phosphors

PERIODICAL: Optika i spektroskopiya, v.12, no.2, 1962, 259-264

TEXT: The authors employed simultaneously the method of exoelectronic emission and thermal emission of phosphorescence to study the levels of localisation of crystallo-phosphors in high vacuum. This arrangement made it possible to differentiate between the trapping levels of electrons and holes. The apparatus is shown in Fig.1. The samples were baked for one hour at 250 °C, at 5 x 10^{-5} mm Hg, and cooled to the required temperature. Excitation was by 6 keV, 0.1 mA/cm^2 electrons from the gun, or by UV. The emission curves of both types were taken simultaneously, over a temperature range from -156 to +250 °C. Both phosphors were prepared from pure carbonates adding fluxes

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Caption to Fig.1. High vacuum installation and block diagram of the electron emission registration

Д - oil diffusion pump; Л1, Л2 - liquid nitrogen traps;
ЛМ - ionisation gauge; Ш - ground joint; К - sample holder;
О - sample; З - earthing of holder; Т - thermocouple leads;
Н - electric furnace leads; Уф - quartz window;
ЭП - electron gun; ЭУ - photomultiplier;
А - photomultiplier anode; ВС - HT stabilised DC supply;
ДН - potential divider; R - rheostat;
С - decoupling condenser; ШУ - wideband amplifier;
ЭО - CRT; ПУ - scaler; И - impulse integrator.

Card 3/4

24.3500

36497
S/051/62/012/003/007/016
E202/E192

AUTHORS: Levshin, V.L., and Ryzhikov, B.D.

TITLE: The causes of the fall in luminescence intensity during mechanical comminution of zinc sulphide phosphors. II.

PERIODICAL: Optika i spektroskopiya, v.12, no.3, 1962, 400-406

TEXT: This work is the continuation of a previous work of the present authors (Ref.1:Opt. i spektr. v.10, 1961, 505). It studies ZnS phosphors activated with one of the following: Cu; Sm; Pb; Mn. In order to obtain consistent and homogeneous types of lattice deformation the phosphors were comminuted and divided into fractions by means of sedimentation, and this whole operation was repeated a number of times, a procedure which allowed comparison of the luminescence of the grains of the same average size but derived by single or repeated sedimentation. The experimentation included measurement of brightness of the layers made of various fractions excited by the 436, 405, 366 and 312 mμ lines of Hg. The average linear size of the grains ranged from 2 to 25 μ. In addition the

Card 1/2

LEVSHIN, V.L.; MAMEDOV, Kh.I.

Fluorescence and absorption spectra of stilbene in octane at low temperatures. Opt.i spektr. 12 no.5:593-598 My '62. (MIRA 15:5)

(Stilbene--Spectra) (Octane) (Fluorescence)

43493

S/051/62/013/006/008/027
E039/E120

24.3500

AUTHORS: Levshin, V.L., and Krotova, L.V.

TITLE: Associated nature of the concentration quenching of the luminescence of Na-fluoresceine in aqueous and glycerine solutions

PERIODICAL: Optika i spektroskopiya, v.13, no.6, 1962, 809-818

TEXT: The spectra, quenching and other characteristics of aqueous and glycerine solutions of Na-fluoresceine are investigated. Concentration quenching is shown to be connected with the formation of non-luminescent associations in the solution. Thermal dissociation is so small that a noticeable degree of association arises only at large concentrations. This explains the slow change of absorption spectra with increasing concentration. The small value of non-active absorption has a comparatively weak effect on the development of concentration quenching. Most of the quenching occurs as a result of the migration of excitation energy in non-luminescent associations. The nature of the solvent and the concentration

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S/051/62/013/006/007/027 E S/051/62/013/006/008/027

of monomer molecules has no significant effect on the development of concentration quenching.
There are 7 figures and 5 tables.

SUBMITTED: October 21, 1961

Card 2/2

LEVSHIN, V.L.

Introductory remarks. Izv. AN SSSR. Ser. fiz. 26 no.1:2-6 Ja '62. (MIRA 15:2)

(Luminescence)
(Vavilov, Sergei Ivanovich, 1891-1951)

S/048/62/026/001/004/018
B125/B104

AUTHOR: Levshin, V. L.

TITLE: Migration of energy in solutions and the association theory of luminescence quenching

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Seriya fizicheskaya, v. 26, no. 1, 1962, 43 - 51

TEXT: The present article is a survey on research work in the field of concentration quenching of luminescence in solutions carried out at the Physics Institute of the AS USSR by Ye. G. Baranova, L. V. Krotova, and V. L. Levshin (Izv. AN SSSR. Ser. fiz., 20, 397, 424 (1956); 22, 1032 (1958); Optika i spektroskopiya, 6, 55 (1959); 10, 362 (1961); J. chim. phys., 55, 869 (1958); Sb. Termodinamika i stroyeniye rastvorov, 215, Izd. AN SSSR, 1959) as well as at Moscow University by L. V. Levshin and collaborators (Sb. Doklady Mezhvuzkovskoy nauchnoy konferentsii po spektroskopii i spektral'nomu analizu (Reports of the scientific conference of schools of higher education on spectroscopy and spectral analysis), 110, Tomsk, 1960; Optika i spektroskopiya, 10, 627, 759 (1961); 11, 278 (1961);

Card 1/2

S/048/62/026/004/002/014
B104/B102

AUTHOR: Levshin, V. L.

TITLE: Accumulation and transfer of excitation energy in crystal phosphors

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Seriya fizicheskaya, v. 26, no. 4, 1962, 450 - 459

TEXT: This review article deals with investigations carried out at the institutions mentioned under "Association" in the years 1947 - 62. Subjects: (1) formation and filling of electron and hole traps; (2) transfer and second localization of electrons; and (3) energy transfer in crystal phosphors and interaction of activators. In a discussion, B. M. Orlov reported on experiments which showed that electrons appeared in the conduction band immediately after the absorption of an infrared quantum on trap levels. Some of these electrons recombine with emission, while the major part is trapped on shallow levels, and produces secondary fluorescence. B. M. Nosenko of Tashkentskiy gosudarstvennyy universitet im. V. I. Lenina (Tashkent State University imeni V. I. Lenin) reported

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S/048/62/026/004/002/014
B104/B102

Accumulation and transfer of...

on investigations into the exoelectron emission of $CaSO_4$, $CaSO_4$-Mn, and $CaSO_4$-Sm phosphors. The first mentioned phosphor possesses no thermoluminescence but intense exoelectron emission, the second has both intense thermoluminescence and intense exoelectron emission, and the third exhibits intense thermoluminescence but no exoelectron emission. The peaks of exoelectron emission and thermoluminescence do not coincide. There are 10 figures.

ASSOCIATION: Fizicheskiy institut im. P. N. Lebedeva Akademii nauk SSSR (Physics Institute imeni P. N. Lebedev of the Academy of Sciences USSR). Fizicheskiy fakul'tet Moskovskogo gos. universiteta im. M. V. Lomonosova (Physics Division of the Moscow State University imeni M. V. Lomonosov)

Card 2/2

LEVSHIN, V.L.

Concluding address by V.L.Levshin. Izv. AN SSSR. Ser. fiz. 26 no.4:539-540 Ap '62. (MIRA 15:4)
(Luminescence)

LEVSHIN, V.L.

Problems concerning luminescence in the light of the resolutions passed by the 22d Congress of the CPSU. Izv. AN SSSR. Ser. fiz. 26 no.4:541-544 Ap '62. (MIRA 15:4)
(Luminescence)

LEVSHIN, V. L.,

"The use of rare-earth metals as activators of fluorescent lamps."

report presented at the Conf. on New Trends in the Study and Applications of Rare Earth Metals, Moscow, 18-20 Mar 63

LEVSHIN, V.L., doktor fiz.-matem.nauk

Molecular luminescence and luminescence analysis. Vest. AN SSSR 32 no.12:99-101 D '62. (MIRA 15:12)
(Luminescence—Congresses)

9,3120

S/181/63/005/002/049/051
B102/B186

AUTHORS: Levshin, V. L., and Pipinis, P. A.

TITLE: Heat-induced electron emission of crystal phosphors based on zinc sulfide

PERIODICAL: Fizika tverdogo tela, v. 5, no. 2, 1963, 691 - 693

TEXT: The effect that crystal phosphors pre-excited by UV light or electron irradiation emit electrons when uniformly heated is not yet completely explained. Therefore the authors investigated the dependence of the electron emission of ZnS crystals on their degree of impurity and on the gas medium surrounding them. The experiments should show if the electron emission was caused by trapping centers (A. Bohún, Czechosl. J. Phys. 6, 628, 1956; G. Gourgé, W. Hanle, Acta Phys. Austr. 10, 339, 1957) or by adsorbed gas (W. Behmenburg, Zs. Phys. 164, 222, 1961; H. Hieslmair, H. Müller, Zs. Phys. 152, 642, 1958). The measurements were made with pure and Cu- and Pb-doped ZnS excited by glow discharge (in Ar, He or air, 20°C) or cathode rays (3 kev in vacuo). An argon-ethanol GM counter or an electron multiplier served for electron recording. Results: ZnS with and without

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S/181/63/005/002/049/051
B102/B186

Heat-induced electron ...

activator shows electron emission peaks at 110, 148 and 210°C. ZnS activated with Pb or Cu shows additional peaks at -18, +16, 65 and 80°C. The peak at +16°C is observed only with Pb activation and with cathode-ray excitation it is the main peak. The peak intensity is very sensitive to the kind of excitation. According to the results, at least a few peaks depend on dislocation levels formed by activator impurities. Adsorption seems to have no effect. There are 2 figures and 1 table.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova (Moscow State University imeni M. V. Lomonosov)

SUBMITTED: June 25, 1962

JA

Card 2/2

LEVSHIN, V.L.; MAMEDOV, Kh.I.

Fluorescence and phosphorescence spectra of β-methyl naphthalene in normal and isoparaffin solvents at 77°K. Vest. Mosk. un. Ser. 3: Fiz., astron. 18 no.2:30-36 Mr-Ap '63. (MIRA 16:6)

1. Kafedra optiki Moskovskogo gosudarstvennogo universiteta i Institut fiziki Azerbaydzhanskoy SSR.
(Naphthalene—Spectra)

S/0188/63/000/003/0048/0054

ACCESSION NR: AP3001772

AUTHOR: Levshin, V. L.; Orlov, B. M.

TITLE: Study of optical flashes and optical quenching in crystalline phosphores

SOURCE: Moscow. Universitet. Vestnik. Seriya 3. Fizika, astronomiya, no. 3, 1963, 48-54

TOPIC TAGS: optical flash, optical quenching, crystalline phosphore, phosphorescence, secondary phosphorescence, thermal activation energy, zinc sulfide phosphore, stimulated emission, induced emission

ABSTRACT: A theoretical and experimental study of the development and decay of optical flashes in phosphorescent crystals has been conducted. A previously excited (by the 365-mu mercury line) and quenched ZnS·Cu·Pb phosphore was irradiated by short pulses of infrared, and the resulting emission was detected by a photomultiplier and registered by an oscillograph. The brightness of the resulting flash increased rapidly to a maximum and then underwent a slow quenching process induced by secondary phosphorescence. ZnS, ZnS·Cu, ZnS·Cu·Ni, and ZnS·Cu·Co phosphores yielded analogous results. The thermal activation energies of the flash and the quenching were studied with the samples excited by the 365-muline and heated at a

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ACCESSION NR: AP3001772

rate of 20C/min. Results show that stimulated emission in ZnS phosphores is determined almost fully by secondary phosphorescence. Previous data concerning the CaS·Bi phosphore are interpreted as showing the phenomenon of development of secondary phosphorescence after cessation of the infrared stimulus. The development times of the flashed were 10^{-5} -- 10^{-3}sec., depending on the temperature of the experiment. Thermal activation energy of the optical flash was shown to be 1.5--2 times greater than the optical quenching energy. Orig. art. has: 5 figures and 1 table.

ASSOCIATION: Kafedra optiki (Optics Department)

SUBMITTED: 15Sep62 DATE ACQ: 09Jul63 ENCL: 00

SUB CODE: PH NO REF SOV: 006 OTHER: 001

Card 2/2

L 18738-63 EWT(m)/BDS ASD RM/MAY S/2941/63/001/000/0084/0094

ACCESSION NR: AT3002200

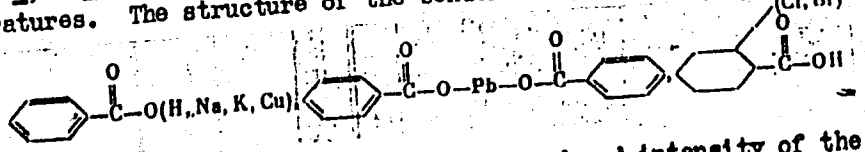
AUTHORS: Levshin, V. L.; Rebane, V. N.

TITLE: On luminescence spectra of benzoic acid and its salts

SOURCE: Optika i spektroskopiya; sbornik statey. v. 1: Lyuminestsentsiya. Moscow, Izd-vo AN SSSR, 1963, 84-94

TOPIC TAGS: luminescence, benzoic acid, absorption, emission

ABSTRACT: A study has been made of the absorption and emission spectra, the laws of decay and relative yield of luminescence, and the effect of heavy atoms in benzoic acid, the Na_, K_, Cu_, Pb_ salts of benzoic acid and Cl_, Br_ substitutes at liquid nitrogen temperatures. The structure of the benzoic acid molecule is given:



From the spectral analysis it was shown that the spread and intensity of the absorption bands vary uniformly from one salt to another and that the introduction

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L 18738-63
ACCESSION NR: AT3002200

of Cl and Br significantly affects the electronic levels. The spectra of luminescence duration seems to vary from that of absorption, with emission bands strongly dependent on polarization media. Furthermore, the spectra of these salts show individual characters and change only slightly when heavy metallic atoms are present. Orig. art. has: 6 figures, 6 tables, and 6 formulas.

ASSOCIATION: none

SUBMITTED: 09Mar62 DATE ACQ: 19May63 ENCL: 00

SUB CODE: PH NO REF SOV: 004 OTHER: 003

Card 2/2

ACCESSION NR: AT4001250 S/2504/63/023/000/0064/0135

AUTHORS: Levshin, V. L.; Arapova, E. Ya.; Blazhevich, A. I.; Voronov, Yu. V.; Voronova, I. G.; Gutan, V. B.; Lavrov, A. V.; Popov, Yu. M.; Fridman, S. A.; Chikhacheva, V. A.; Shchavenko, V. V.

TITLE: Study of cathode luminescence of zinc sulfide and other cathode phosphors

SOURCE: AN SSSR. Fizicheskiy institut. Trudy*, v. 23, 1963, 64-135

TOPIC TAGS: luminescence, cathode luminescence, phosphor, zinc sulfide phosphor, phosphorescence, photoluminescence, zinc sulfide, excitation energy, phosphor excitation

ABSTRACT: This is a review article devoted to a theoretical and experimental analysis of excitation energy losses in cathode luminescence, the approximate maximum cathode luminescence yield, exchange

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ACCESSION NR: AT4001250

of energy between an electron beam and a layer of luminor through which it passes, and also the evolution of individual glow processes as functions of the excitation density and the temperature. Particular attention is paid to an investigation of the persistence properties of ZnS phosphors and their connection with the location and filling of the electron and hole localization levels. A detailed analysis is made of the energy losses resulting from thermalization of the electrons and holes, and it is shown that in cathode luminescence these unavoidable losses are very large and decrease the glow efficiency by approximately 2.5 times. Allowing for other losses, the over-all glow efficiency in cathode luminescence cannot exceed 0.27--0.30. The study of the passage of an electron beam through sublimated layers of zinc-sulfide luminors has established the voltage dependence of the electron penetration depth and the energy losses at different depths of electron penetrations. The dependence of the spectral composition, brightness, and energy glow yield of various zinc-sulfide and phosphate luminors on the current density,

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ACCESSION NR: AT4001250

voltage, and temperature were investigated. A glow efficiency of 0.256 was calculated for one type ZnS-Ag luminor. The attenuation of glow of different types of cathode luminors to 0.1, 0.01, and 0.001 of the initial brightness was investigated and the presence of two superimposed de-excitation processes of different durations is established. The causes of the reduction in the duration of afterglow with increasing excitation density are considered. The arrangement and development of localization level of the investigated luminors was studied by the thermal de-excitation method and a connection was established between the attenuation and liberation of the levels at definite depths. "The authors are grateful to senior designer A. G. Ovchinnikov, radio technicians V. P. Ly*sov and Yu. A. Platukhin, senior laboratory assistants Z. M. Bruk, S. B. Kondrashkin, N. V. Mitrofanova, L. N. Petrakov, and A. D. Sy*chkov and laboratory assistant V. P. Prokhorova who helped with the present work." Orig. art. has: 66 figures, 28 formulas, and 4 tables.

Card 3/4

ACCESSION NR: AT4001250

ASSOCIATION: Fizicheskiy institut im. P. N. Lebedeva AN SSSR (Physics Institute, AN SSSR)

SUBMITTED: 00 DATE ACQ: 30Nov63 ENCL: 00

SUB CODE: PH NO REF SOV: 049 OTHER: 030

Card 4/4

L 18748-63 EWP(q)/EWT(m)/BDS AFFTC/ASD JD/JG
ACCESSION NR: AT3002226 S/2941/63/001/000/0230/0239

AUTHORS: Levshin, V. L.; Voronov, Yu. V.; Gutan, V. B.; Fridman, S. A.; Shchayenko, V. V. 60

TITLE: Radiation composition of luminescence centers in ZnS-Sm phosphors

SOURCE: Optika i spektroskopiya; sbornik statey, v. 1: Lyuminestsentsiya. Moscow, Izd-vo AN SSSR, 1963, 230-239

TOPIC TAGS: radiation, phosphor, activator, ion, spectra

ABSTRACT: The spectra of Sm^{3+} in ZnS-Sm-phosphor without melt and with 4% $MgCl_2$ melt were analyzed to study the interaction between activator ions and the lattice and obtain information about radiation composition. The Sm concentration was varied between 10^{-7} and 10^{-2} gm/gm, and in addition a variable concentration of silver was added (10^{-6} to 10^{-3} gm/gm). Three types of luminescence centers were obtained, lying in the red, orange, and yellow-green parts of the spectra. These were enhanced by changing the phosphor composition. A temperature test from 20-120C indicated that several radiation bands were formed as a result of electronic and vibrational frequency combinations. Orig. art. has: 7 figures and 4 tables.

Card 1/2

L 19486-63 EWT(1)/EWP(q)/EWT(m)/EWP(B)/BDS AFFTC/ASD/IJP(C)/SSD JD
ACCESSION NR: AT3002237 S/2941/63/001/000/0290/0299

AUTHORS: Levshin, V. L.; Reshetina, T. S.; Tunitskaya, V. F.; Vasil'yeva, Ye. G.

TITLE: Stimulating action of infrared radiation on zinc sulfide phosphors

SOURCE: Optika i spektroskopiya; sbornik statey. v. 1: Lyuminestsentsiya. Moscow, Izd-vo AN SSSR, 1963, 290-299

TOPIC TAGS: electron, trap, energy level, infrared, absorption, flashing, phosphorescence

ABSTRACT: An investigation was made of the flashing process in ZnS with electrons trapped (or localized) in shallow levels under infrared excitation of wavelength 1μ to 3.5μ. The infrared response of these phosphors was studied at -77, -196 and -259C. Flash-emitting energy levels were established after obtaining the thermoluminescence curves of several zinc sulfide phosphors. The effect of infrared radiation of various wave lengths on one specimen, under varying conditions of excitation, was studied in great detail. It is shown that quenching, maximum absorption in radiation spectra, and the flash magnitude under stimulation of infrared radiation at the excitation level of 365 millimicron is 1.5 to 2.0 times lower than the excitation at λ = 1.1 millimicron. This is attributed to action of p-type levels

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L 19486-63
ACCESSION NR: AT3002237

(differences in trapped electron absorptions). A study was also made of the growth and decay of flashing and the phosphorescence damping at various temperatures. Orig. art. has: 7 figures and 4 tables.

ASSOCIATION: none

SUBMITTED: 29Jun62 DATE ACQ: 19May63 ENCL: 00

SUB CODE: PH NO REF SOV: 012 OTHER: 006

Card 2/2

LEVSHIN, V.L.

Concentration quenching of luminescence. Izv.AN SSSR.Ser.fiz. 27 no.4:540-550 Ap '63. (MIRA 16:4)

1. Fizicheskiy institut imeni P.N.Lebedeva AN SSSR.
(Organic compounds) (Luminescence)

BARANOVA, Ye.G.; LEVSHIN, V.L.

Concentration quenching of the luminescence of alcoholic solutions of rhodamine. 6G. Izv.AN SSSR.Ser.fiz. 27 no.4:554-557 Ap '63. (MIRA 16:4)

1. Fizicheskiy institut imeni P.N.Lebedeva AN SSSR.
(Rhodamine—Spectra)

L 10163-63 EPF(c)/EWT(m)/BDS--ASD--Pr-4--
RM/MAY/WW

ACCESSION NR: AP3000309 S/0048/63/027/005/0606/0608

62
59

AUTHOR: Levshin, V. L.; Mamedov, Kh. I.

TITLE: Fluorescence and phosphorescence spectra of alpha- and beta-methylnaphthalenes in normal isoparaffinic solvents at 77°K [Reports: Eleventh Conference on Luminescence held in Minsk 10-15 Sept. 1962]

SOURCE: Izvestiya AN SSR. Seriya fizicheskaya, v.27 no. 5, 1963, 606-608

TOPIC TAGS: fluorescence, phosphorscence, methylnaphthalenes

ABSTRACT: The present work, a continuation of a series of investigations of the fluorescence and phosphorescence spectra of individual aromatic and other hydrocarbons and narrow petroleum fractions in frozen isoparaffinic solutions, was concerned with alpha- and beta-methylnaphthalenes. The compounds were obtained from the Institute of Petrochemical Synthesis of the SSR Academy of Sciences. The solvents were n-hexane and 2,2,4-isooctane. The measurement procedure and the fluorescence spectrum of the beta compound have been described in Vestnik Mosk. un-ta. No. 2, 30, 1960. In the present report the alpha-

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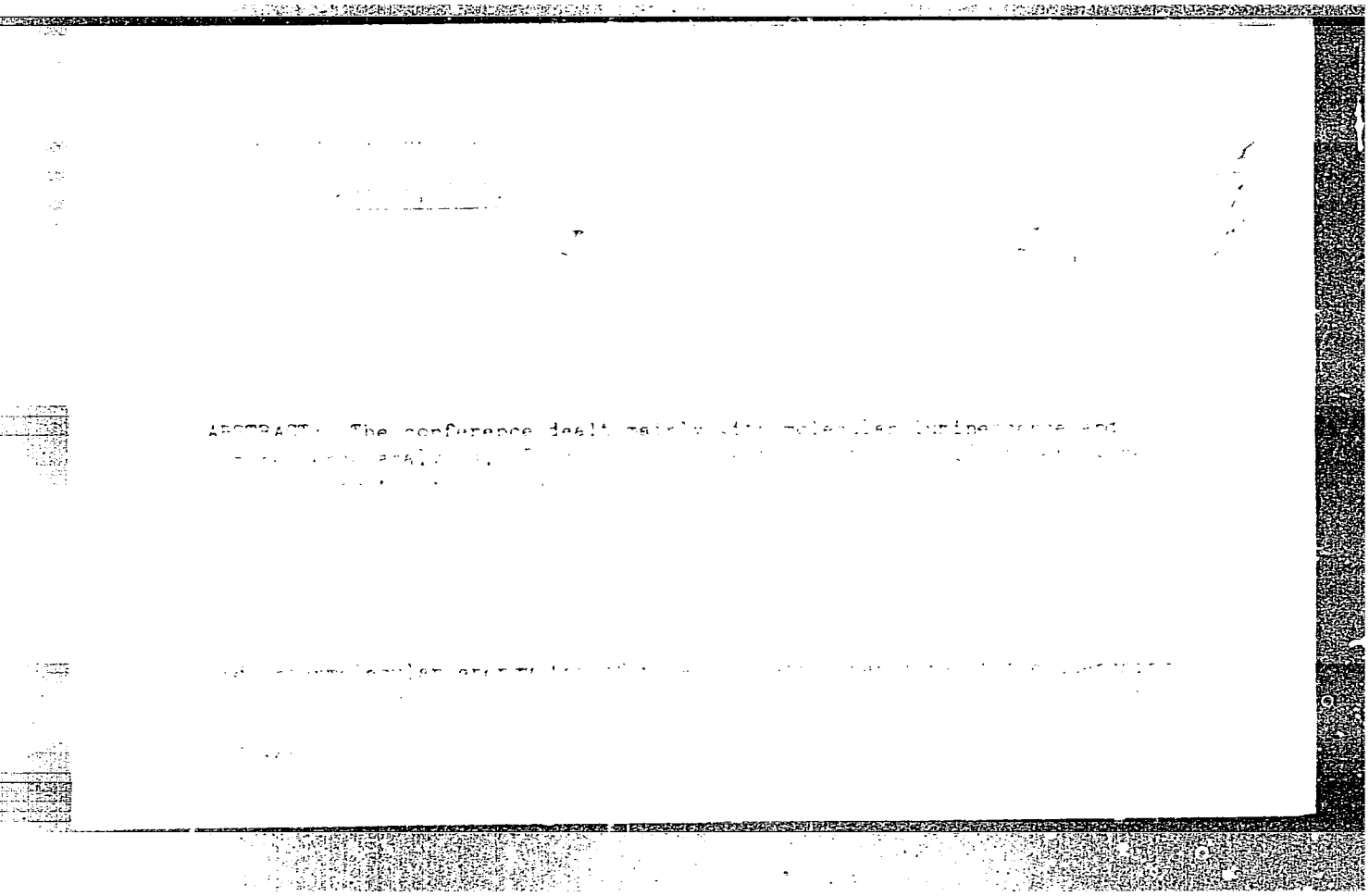
L 10163-63
ACCESSION NR: AP3000309

3

methylnaphthalene fluorescence spectrum is described and compared to the beta-compound spectrum and both phosphorescence spectra are characterized and analyzed. It was found that the fluorescence and phosphorescence spectra of the methylnaphthalenes in the same solvent differ. Thus a solvent suitable for bringing out fluorescence line spectra, may be unsuitable for development of phosphorescence fine structure. Comparison of the alpha and beta spectra shows that shift of the substituent in the naphthalene chain from the alpha to the beta position radically alters the line structure of the fluorescence spectrum but has little effect on the phosphorescence. Isoparaffins are suitable solvents for bringing out fluorescence lines, which are often useful and significant for analysis of petroleums and hydrocarbon mixtures. "The authors express their gratitude to Ye. S. Pokrovskaya for making available the pure compounds for investigation." Orig. art. has: 1 equation, 2 figures, and 1 table.

ASSOCIATION: fizicheskii fakul'tet Moskovskogo gos. universiteta im. M. V. Lomonosova (Physics Dept., Moscow State University); Institut fiziki Akademii nauk AzerbSSR (Institute of Physics, Academy of Sciences, Azerbaidzhan SSR)

SUBMITTED: 00 DATE ACQ: 12Jun63 ENCL: 00
SUB CODE: PH,CH NR REF SOV: 008 OTHER: 001
Card 2/2 PH/GP



especially in biology, medicine, and

L 14962-65 EWT(m)/EWP(e)/EWP(b) Pq-4 AS(mp)-2/ESD(gs) JD/JG/MLK/WH
ACCESSION NR: AT4048694 S/0000/64/000/000/0060/0066

B

AUTHOR: Levshin, V. L.

TITLE: Rare earth elements as luminophor activators

21

SOURCE: Vsesoyuznoye soveshchaniye po splavam redkikh metallov, 1963. Voprosy* [illegible] (Problems in the theory and use of [illegible] i primeneniya redkozemel'ny [illegible] rare-earth metals); materialy* soveshchaniya. [illegible] Moscow, [illegible] Nauka, 1964, [illegible]

TOPIC TAGS: rare earth element, phosphor, luminescence activator, luminescence center

ABSTRACT: Rare earth metals are currently being used as activators of phosphors with different bases. The ions of rare earth metals are also being introduced into crystals and glass to create luminescence centers. The rare earth metals double the number of activators ensuring luminescence in the visible, infrared and ultraviolet areas of the spectrum. When rare earth metals in [illegible] crystals [illegible] [illegible] cubic crystals are activated [illegible] also polarized. The rare earth element [illegible] holes arising during phosphor activation. [illegible] phosphor is uniformly heat-excitation. Luminescence increases when the activated phosphor is uniformly heat- [illegible]. The author notes, however, that each activator has its own level of localiza-

Card 1/2

L 14962-65
ACCESSION NR: AT4048694

tion. The combined action of two activators varies the level, leading to new levels lacking in a phosphor with only one activator. It is also possible to vary the duration of luminescence. A very important process in the crystal lattice is [illegible] color of crystal luminescence. [illegible] aims, obtaining luminescence of different colors from the same phosphor depending on activation conditions. The rare earth metals, finally, may be used to activate single crystals of fluorite and calcium tungstate, as well as glass, in order to obtain the working substance for quantum light generators producing narrow monochromatic beams. These generators are based on the use of forced radiation for high-energy level observation. The concentration of activators introduced is 0.01-0.001% of the weight of the main substance. The required quantity of rare earth metals is therefore very low, but as the requirement grows the demand will increase. In some cases, 1-2% of the activators is required. In such cases, the demand for the rare earth elements will increase rapidly. The elements should be purified to an admixture content of no more than 0.01-0.001%. Orig. art. has: 5 figures and 2 tables.

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Spectral characteristics of some lamellar phosphors and the nature of their luminescence centers. Opt. i spektr. 17 no.6:908-915 D '64. (MIRA 18:3)

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TITLE: Study of spectral characteristics of some layered phosphors and the nature of their glow centers

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ABSTRACT: The absorption and emission spectra and the relative luminescence yield of ZnS-PbI$_2$ powdered and sublimated phosphors was investigated as part of an exhaustive study of the growth of the simplest laminated phosphors. Since preliminary investigations have shown that the spectral properties of the phosphors depend somewhat on the method of preparation, the spectral properties were compared for samples prepared by two methods: 1. Simultaneous roasting of a mixture of both components at 300--350° followed by rapid cooling. 2. Slow evaporation of alcohol solutions of the components with continuous

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